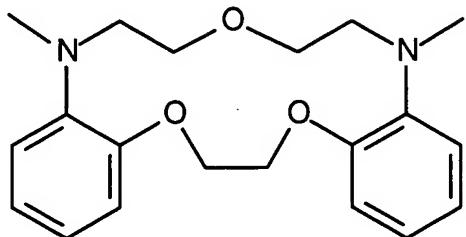


ABSTRACT OF THE DISCLOSURE

The invention describes crown ether chelators, including crown ethers having the formula

5



and aza-substituted and thia-substituted analogs thereof. These crown ethers are substituted by a dye moiety, a chemically reactive group, a conjugated substance, or a combination thereof.

P
E
G
N
G
O
R
U
L
E
S
T
E
P
10
Q
15

Chelators that are substituted by fluorescent dyes are particularly useful as indicators for metal cations, particularly Na⁺ and K⁺ ions, and particularly where binding of the target ion results in a change in the fluorescence properties of the indicator that can be correlated with the ion concentration. Methods are provided for utilizing reactive groups on the chelators for conjugation to dyes, lipids and polymers and methods for enhancing entry of the indicators into living cells.